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# Coke formation through oil upgrading of heavy oil by superheated steam

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## Abstract

© SGEM2018. The effect of coke formation on the pore structure and permeability in the process of the in-situ upgrading of heavy oil under supercritical condition has attracted more and more attention. Studying coke formation induced by thermal treatment is currently an important task for selecting the optimum upgrading technologies for heavy and extra-heavy oils. This research is intended to evaluate coke formation through the process of aquathermolysis in the condition of superheated steam injection. In this study, upgrading experiments were carried out in a stainless-steel 500-ml batch parr reactor (4575/76 hp/ht reactor) equipped with a heating mantle and a temperature controller. In a typical experiment, the reactor was loaded with crude oil (ashalcha crude oil) and water at a weight ratio of 2:1, respectively, and experiment was run in the form of supercritical fluid (T = 380 ºC, P = 222.3 bar) for 24h. The properties of the obtained coke and upgraded oil before and after experiments were analyzed including: viscosity, API gravity and SARA analysis of oil and FTIR spectroscopy of yielded coke. Liquid, coke and gas yield were evaluated after the experiment. The results show a high content of coke and gas formation due to conversion, polymerization and condensation of high-molecular compounds like asphaltenes and resins.

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## Keywords

Aquathermolysis, Coke, Heavy oil, Supercritical fluid, Superheated steam

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